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= Year 12 **= Calculus II** **= Worksheet 8**

1. Verify that $y = 2e^{2x} + x + \frac{1}{2}$ is a solution to $\frac{dy}{dx} - 2y + 2x = 0$.	2. Find the value(s) of constant k such that $y = \sin kx - \cos kx$ is a solution to $\frac{d^2y}{dx^2} + y = 0$.
3. Find the constants a and b such that $y = xe^x$ is a solution to $\frac{d^2y}{dx^2} + a\frac{dy}{dx} + by = 0$.	4. Verify that $y = Ae^{ax} + \frac{b}{a}\left(e^{ax} - 1\right)$ satisfies $\frac{dy}{dx} = ay + b$, where a and b are positive constants.
5. Verify that $y = e^{ax}\sin(bx)$ satisfies the equation $\frac{d^2y}{dx^2} - 2a\frac{dy}{dx} + \left(a^2 + b^2\right)y = 0$.	6. Verify that $y = \sin(\log_e x) + \cos(\log_e x)$ satisfies the equation $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$.
7. Solve $\frac{dy}{dx} = \frac{3}{1 + 9x^2}$, given $y\left(-\frac{1}{3}\right) = 0$.	8. Solve $t\frac{dx}{dt} - \log_e t = 0$, given $x = 1$ when $\log_e t = \sqrt{2}$.
9. Solve $\frac{d^2x}{dt^2} = t^2 + 3\cos t$, given $x = 2$ and $\frac{dx}{dt} = 3$ when $t = 0$.	10. Use technology to evaluate y when $x = 1$, given $\frac{dy}{dx} = \sin\left(x^2\right)$ where $y = 2$ when $x = 0$.
11. Use technology to evaluate V when $t = 2$, given $\frac{dV}{dt} = \log_e(t + 1) + 1$ where $V = 5$ when $t = 1$.	Numerical, algebraic and worded answers. 2. ± 1 3. $a = -2$, $b = 1$ 7. $\tan^{-1}(3x) + \pi/4$ 8. $(\log_e t)^2/2$ 9. $t^4/12 + 3t - 3\cos t + 5$ 10. ≈ 2.31 11. ≈ 6.91